Session IX: Impact of Recent Environmental Regulations on Defense, Test, Evaluation and Training

Case Study: Halon Replacements for Aircraft Fire and Explosion Protection

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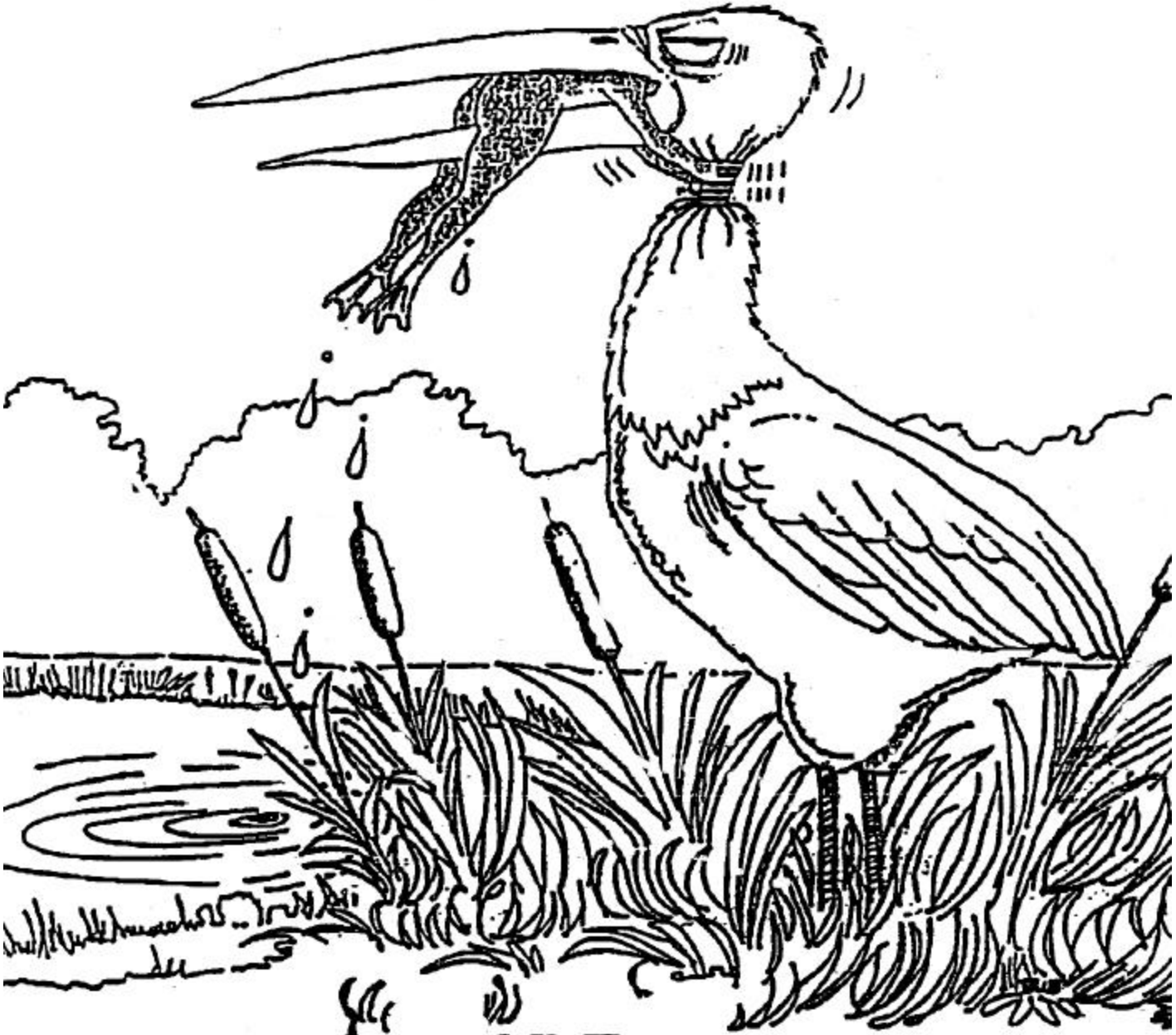
History

- Montreal Protocol: Bans the PRODUCTION of Ozone Depleting Substances by 1994
- Copenhagen and successive Amendments: Create exemptions for critical use
- Consensus: Difficult problem to solve but implement solutions as they come available
- AF takes lead in developing Halon 1211 alternatives, all services dive in 1301 replacements

RDT&E Pays Off...
After $11 million and 7 years...

	Halon 1301	Halon 13001	FC-218	HFC-125
Chemical Formula	CF_3Br	CF_3I	C_3F_8	C_2F_5H
Nomenclature	Bromotrifluoromethane	Trifluoromethyliodide	Perfluoropropane	Pentafluoroethane
Trade Name	Halon 1301	Triodide	CEA 308	FE 25
Molecular Weight	149	196.91	188.02	120.02
Boiling Pt @ 1 atm (F)	-72	-9	-34.1	-54.7
Critical Temperature (F)	154	251	161.4	151.25
Vapor Pressure (psia)	216	63.7	114	190
Solubility in Jet Fuel	5.2	To Be Tested	1.2	Not Tested
GWP	5600	5	6100	2800
ODP	10 to 14	0.0002	0	0
Atmospheric Lifetime	50 yrs	5 days	6000 yrs	30 yrs



Don't EVER give up!

Success to date

- Found CF_3I as replacement for fuel tank inertion for the F16
  - Example of interagency cooperation
    - DOTE-JLF,EPA, AFRL, Academia and Commercial industry teamed to assess occupational safety, performance, risk assessment, cost
    - Found CF_3I very suitable for use in normally unoccupied areas such as the F16 fuel tank, engine nacelles, dry bays and military hardware
    - Performance: **DROP IN REPLACEMENT** for F-16 fuel tank, F15, F18 engine nacelle prelim data shows drop in behavior
- Approved for use by ASC (low risk of insertion)

Retrofit Costs

- Total retrofit cost:$12.4 million
  - 1415 aircraft
  - $6300 per F16, estimate 200,000 pounds buy of CF_3I. Begin in FY 04, be done in 5 years
  - Perform replacement on regular maintenance schedule thus no significant down time

Halon Bank

- Established by DLA, with concurrence of EPA
- “Responsible User” Policy: Use but perform RDT&E and implement when replacement is found

Current USAF Policy on Halon Replacements

- Halon bank stands by the year 2014 at 2.4 million pounds
    - Recent purchase by US DOD of Australian Bank adds 500,000 pounds
- CF_3I, even though potentially a direct retrofit, would add cost and thus make it economically unfeasible to replace
- Therefore,

CONTINUE TO USE BANK

Rationale

- Priorities have shifted
  - Increased deployment for humanitarian-non traditional military missions shift resources from RDT&E into Modernization, and Readiness
  - Pie has not gotten bigger: Choices are simple:
    - Buy bullets for our soldiers in Kosovo or
    - Replace Ozone Depleting Substances

Consequences of Inaction

- Cancer rates are increasing in Southern Hemisphere:
  - UV Fluxes have steadily increased
  - Stratospheric Br. Cl loading have steadily increased
- Phytoplankton and ecological dislocation -disruption are real

Responsible Policy

- When possible and economically feasible... Replace!
- Greatest burden to replace Halon belies on greatest generators of pollution
- Stewardship of the environment is our duty to future generations

Thank you for your attention